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# FCC Test Report

## Dynamic Frequency Selection

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**Report No: WD-RF-R-230156-C0**

**Product Name** : UC Phone  
**Model Name** : CP-ROOM  
**FCC ID** : LDKROOM2217  
**Applicant** : Cisco Systems Inc  
**Received Date** : Mar. 25, 2023  
**Tested Date** : Mar. 31, 2023 ~ Jun. 07, 2023  
**Applicable Standard** : 47 CFR FCC Part 15, Subpart E (Section 15.407)  
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02  
KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02



### Wendell Industrial Co., Ltd

### Wendell EMC & RF Laboratory

**Caution:**

This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment.

Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

This report must not be used to claim product endorsement by TAF or any agency of the government.

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# Test Report

Issued Date: June 08, 2023

Project No.: 23Q032501

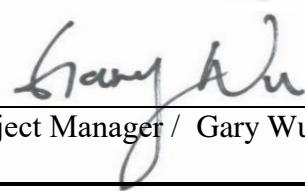
|  |   |
|--|---|
| <b>Product Name</b>                    | UC Phone  |
| <b>Trade Name</b>                      | Cisco Webex Room Phone  |
| <b>Model Name</b>                      | CP-ROOM   |
| <b>FCC ID</b>                          | LDKROOM2217   |
| <b>Applicant</b>                       | Cisco Systems Inc   |
| <b>Manufacturer</b>                    | Cisco Systems Inc   |
| <b>EUT Rated Voltage</b>               | AC 100 ~ 240V ; 50 / 60Hz   |
| <b>EUT Test Voltage</b>                | RSE : POE 56V 、 AC : AC 120V / 60Hz   |
| <b>EUT Supports Radios Application</b> | WLAN 802.11a/b/g<br>WLAN 802.11n (HT20/HT40)<br>WLAN 802.11ac (VHT20/40/80)   |
| <b>Applicable Standard</b>             | 47 CFR FCC Part 15, Subpart E (Section 15.407)<br>KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02<br>KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02 |
| <b>Test Result</b>                     | Complied  |

**Documented :**


( Specialist / Emma Lu )

**Technical Engineer :**


( Section Manager / Jack Chang )

**Approved :**


( Project Manager / Gary Wu )

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## Document Revision History

| Report No.        | Issue date    | Description    |
|-------------------|---------------|----------------|
| WD-RF-R-230156-C0 | June 08, 2023 | Initial report |

## Summary of Test Result

| Ref. Std. Clause               | Test Items                        | Result |
|--------------------------------|-----------------------------------|--------|
| 15.407                         | DFS Detection Threshold           | N/A    |
| 15.407                         | Channel Availability Check Time   | N/A    |
| 15.407                         | Channel Move Time                 | Pass   |
| 15.407                         | Channel Closing Transmission Time | Pass   |
| 15.407                         | Non-Occupancy Period              | Pass   |
| 15.407                         | Uniform Spreading                 | N/A    |
| 15.407                         | U-NII Detection Bandwidth         | N/A    |
| 15.407                         | Non-associated test               | N/A    |
| 15.407                         | Non-Co-Channel test               | N/A    |
| Remark : N/A is not applicable |                                   |        |

## 1 Generation Information

### 1.1 Applicant

Cisco Systems Inc  
125 West Tasman Drive, San Jose, California, United States

### 1.2 Manufacturer

Cisco Systems Inc  
170 West Tasman Drive, San Jose, CA, USA, 95134

### 1.3 Factory

1. Shenzhen Fugui Precision Industry Co., Ltd.  
Building D9,D10,E5,E6,F6,F8 and F21, Foxconn Science and Technology Industrial Part,  
East side of Min Qing Road, Longhua Subdistrict Longhua District, Shenzhen, Guangdong  
518108, China
2. FUYU PRECISION COMPONENT CO.,LTD.  
Lo M1 va Lo F, Khu cong nghiep Quang Chau, Xa Van Trung, Huyen Viet Yen, Tinh Bac  
Giang, Viet Nam
3. Scientific-Atlanta de Mexico, S. DE R.L. DE C.V.  
C. Intermex 1680 y Avenue De Las Torres Parque Industrial Intermex CP32690 Cd. Juarez,  
Chihuahua, Mexico

## 1.4 Description of Equipment under Test

|  |  |
|--|--|
| <b>Product Name</b>                    | UC Phone   |
| <b>Model No.</b>                       | CP-ROOM  |
| <b>FCC ID</b>                          | LDKROOM2217  |
| <b>Frequency Range</b>                 | 802.11a/n/ac-20MHz: 5180-5320MHz, 5500-5700MHz, 5745-5825MHz<br>802.11n/ac-40MHz: 5190-5310, 5510-5670MHz, 5755-5795MHz<br>802.11ac-80MHz: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5775MHz   |
| <b>Number of Channels</b>              | 802.11a/n/ac-20MHz: 24, 802.11n/ac-40MHz: 11, 802.11ac-80MHz: 5  |
| <b>Data Rate</b>                       | 802.11a : 6M - 54Mbps<br>802.11n_HT40 : up to 400Mbps<br>802.11ac_VHT80 : up to 866.6Mbps  |
| <b>Type of Modulation</b>              | 802.11a/n/ac: OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM   |
| <b>Antenna Information</b>             | Refer to the table "Antenna List"  |
| <b>DFS Function</b>                    | <input type="checkbox"/> Master <input checked="" type="checkbox"/> Client (without radar detection)<br><input type="checkbox"/> Client (with radar detection)   |
| <b>TPC Function</b>                    | <input checked="" type="checkbox"/> < 500mW not required <input type="checkbox"/> ≥ 500mW employ a TPC   |
| <b>Category of equipment</b>           | <input type="checkbox"/> Adaptive Equipment with LBT based Channel Access Mechanism (Frame Based Equipment)<br><input checked="" type="checkbox"/> Adaptive Equipment with LBT based Channel Access Mechanism (Load Based Equipment) |
| <b>EUT Supports Radios Application</b> | WLAN 802.11a/b/g<br>WLAN 802.11n (HT20/HT40)<br>WLAN 802.11ac (VHT20/40/80)  |
| <b>EUT Rated Voltage</b>               | AC 100 ~ 240V ; 50 / 60Hz  |
| <b>EUT Test Voltage</b>                | RSE : POE 56V 、 AC : AC 120V / 60Hz  |

### Antenna List

| No. | Manufacturer | Model No.       | Antenna Type | Peak Gain  |
|-----|--------------|-----------------|--------------|--|
| 1   | Amphenol     | OCB150-15-000-R | Internal     | 3 for 5.15 ~ 5.25 GHz<br>3 for 5.25 ~ 5.35 GHz<br>3 for 5.47 ~ 5.75 GHz<br>3 for 5.75 ~ 5.85 GHz |

Remark: The antenna of EUT is conforming to FCC 15.203

**Channel List**

| 802.11a/n/ac HT20/VHT20 |                | 802.11n/ac HT40/VHT40 |                | 802.11ac VHT80 |                |
|-------------------------|----------------|-----------------------|----------------|----------------|----------------|
| Channel                 | Frequency(MHz) | Channel               | Frequency(MHz) | Channel        | Frequency(MHz) |
| 36                      | 5180           | 38                    | 5190           | 42             | 5210           |
| 40                      | 5200           | 46                    | 5230           | 58             | 5290           |
| 44                      | 5220           | 54                    | 5270           | 106            | 5530           |
| 48                      | 5240           | 62                    | 5310           | 122            | 5610           |
| 52                      | 5260           | 102                   | 5510           | 155            | 5775           |
| 56                      | 5280           | 110                   | 5550           | --             | --             |
| 60                      | 5300           | 118                   | 5590           | --             | --             |
| 64                      | 5320           | 126                   | 5630           | --             | --             |
| 100                     | 5500           | 134                   | 5670           | --             | --             |
| 104                     | 5520           | 151                   | 5755           | --             | --             |
| 108                     | 5540           | 159                   | 5795           | --             | --             |
| 112                     | 5560           | --                    | --             | --             | --             |
| 116                     | 5580           | --                    | --             | --             | --             |
| 120                     | 5600           | --                    | --             | --             | --             |
| 124                     | 5620           | --                    | --             | --             | --             |
| 128                     | 5640           | --                    | --             | --             | --             |
| 132                     | 5660           | --                    | --             | --             | --             |
| 136                     | 5680           | --                    | --             | --             | --             |
| 140                     | 5700           | --                    | --             | --             | --             |
| 149                     | 5745           | --                    | --             | --             | --             |
| 153                     | 5765           | --                    | --             | --             | --             |
| 157                     | 5785           | --                    | --             | --             | --             |
| 161                     | 5805           | --                    | --             | --             | --             |
| 165                     | 5825           | --                    | --             | --             | --             |

## 1.5 Test Facility

| Items                      | Required (IEC 60068-1) | Actual   |
|----------------------------|------------------------|----------|
| Temperature (°C)           | 15-35                  | 20~25    |
| Humidity (% RH)            | 25-75                  | 45~55    |
| Barometric pressure (mbar) | 860-1060               | 990~1020 |

**Description:** Accredited by TAF  
Accredited Number: 2965

**Issued by:** Wendell Industrial Co., Ltd

**Lab Address:** 6F/6F-1, No.188, Baoqiao Rd., Xindian Dist.,  
New Taipei City 23145, Taiwan R.O.C

**Test Lab:** Wendell EMC & RF Laboratory

**Test Location:** No. 119, Wugong 3rd Rd., Wugu Dist.,  
New Taipei City 248, Taiwan (R.O.C.)

**Designation Number:** TW0025

**Test Firm Registration Number:** 665221

## 1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence (level based on a coverage factor K=2)

| Measurement Project   | Condition           | Expended Uncertainty |
|-----------------------|---------------------|----------------------|
| AC Conducted Emission | 0.150 ~ 30 MHz      | ± 2.64 dB            |
| Radiated Emission     | 0.009 ~ 30 MHz      | ± 3.7 dB             |
|                       | 30 ~ 1000 MHz       | ± 3.9 dB             |
|                       | 1000 ~ 18000 MHz    | ± 4.5 dB             |
|                       | 18000 ~ 40000 MHz   | ± 4.3 dB             |
| RF Power, Conducted   | Conducted Measuring | ± 0.75 dB            |
| Occupied Bandwidth    | Conducted Measuring | ± 2.4 %              |
| Power Density         | Conducted Measuring | ± 1.2 dB             |
| Duty Cycle            | Conducted Measuring | ± 0.9 %              |
| Frequency Stability   | Conducted Measuring | ± 0.062 ppm          |
| DC Power Supply       | --                  | ± 2.0 %              |
| Temperature           | --                  | ± 0.55 °C            |
| Humidity              | --                  | ± 3.1 %              |

**Note:** Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

## 1.7 List of Test Equipment

### For Conducted measurements / RF Conducted Measurement Room

| Equipment |                            | Manufacturer | Model No. | Serial No. | Cal. Date  | Due Date   |
|-----------|----------------------------|--------------|-----------|------------|------------|------------|
| ✓         | Spectrum analyzer          | Keysight     | N9010A    | MY54200737 | 2022/08/01 | 2023/07/31 |
| ✓         | RF Vector Signal Generator | Keysight     | N5182B    | MY53052599 | 2022/08/09 | 2023/08/08 |
| ✓         | DFS Fixture                | MVE          | N/A       | CT-9-059   | 2022/09/07 | 2023/09/06 |

Remark:

1. All equipments are calibrated every one year.
2. The test instruments marked with “✓” are used to measure the final test results.
3. Test Software version: Keysight DFS Radar Profiles v3.0.0.0

| Product      | Manufacturer | Model No. | Serial No.             | Power Cord                   |
|--------------|--------------|-----------|------------------------|------------------------------|
| Notebook PC  | acer         | N16Q1     | NXVD4TA023742254707600 | Non-shielded, 1 Core, 0.8m   |
| Access Point | LINKSYS      | WHW03     | N/A                    | Non-shielded, Non-Core, 1.5m |

Remark: Access Point with FCC ID: Q87-WHW03

## 2 Requirements of DFS Test

### 2.1 Applicability of DFS Requirements Prior to Use of a Channel

| Requirement                            | Operational Mode |                                |                             |
|--|------------------|--------------------------------|-----------------------------|
|  | Master           | Client Without Radar Detection | Client With Radar Detection |
| <b>Non-Occupancy Period</b>            | Yes              | Not required                   | Yes                         |
| <b>DFS Detection Threshold</b>         | Yes              | Not required                   | Yes                         |
| <b>Channel Availability Check Time</b> | Yes              | Not required                   | Not required                |
| <b>U-NII Detection Bandwidth</b>       | Yes              | Not required                   | Yes                         |

### 2.2 Applicability of DFS Requirements During Normal Operation

| Requirement                              | Operational Mode |                                |                             |
|--|------------------|--------------------------------|-----------------------------|
|  | Master           | Client Without Radar Detection | Client With Radar Detection |
| <b>DFS Detection Threshold</b>           | Yes              | Not required                   | Yes                         |
| <b>Channel Closing Transmission Time</b> | Yes              | Yes                            | Yes                         |
| <b>Channel Move Time</b>                 | Yes              | Yes                            | Yes                         |
| <b>U-NII Detection Bandwidth</b>         | Yes              | Not required                   | Yes                         |

| Additional requirements for devices with multiple bandwidth modes | Operational Mode                      |  |
|---|---------------------------------------|--|
|   | Master or Client With Radar Detection | Client Without Radar Detection                       |
| U-NII Detection Bandwidth and Statistical Performance Check       | All BW modes must be tested           | Not required   |
| Channel Move Time and Channel Closing Transmission Time           | Test using widest BW mode available   | Test using the widest BW mode available for the link |
| All other tests   | Any single BW mode                    | Not required   |

**Note**  
Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

## 2.3 Requirement of DFS Detection Threshold

| Maximum Transmit Power   | Value (see notes 1, 2, and 3) |
|--|-------------------------------|
| EIRP $\geq$ 200 milliwatt  | -64 dBm                       |
| EIRP < 200 milliwatt power spectral density < 10 dBm/MHz                     | -62 dBm                       |
| EIRP < 200 milliwatt that do not meet the power spectral density requirement | -64 dBm                       |

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Note 3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

## 2.4 DFS Response Requirement Values

| Parameter                         | Value  |
|-----------------------------------|--|
| Non-occupancy period              | Minimum 30 minutes   |
| Channel Availability Check Time   | 60 seconds   |
| Channel Move Time                 | 10 seconds (See Note 1)  |
| Channel Closing Transmission Time | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period (See Notes 1 and 2) |
| U-NII Detection Bandwidth         | Minimum 100% of the 99% power bandwidth (See Note 3)   |

Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the Burst.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar Burst generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate Channel changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

## 2.5 Requirements of Radar Test Waveforms

### Short Pulse Radar Test Waveforms

Once the performance requirements check is complete, statistical data will be gathered, to determine the ability of the device to detect the radar test waveforms (Short Pulse Radar Types 1-4) found in Table 5. The device can utilize a test mode to demonstrate when detection occurs to prevent the need to reset the device between trials. The percentage of successful detection is calculated by:

$$\frac{\text{TotalWaveformDetections}}{\text{TotalWaveformTrials}} \times 100 = \text{Percentage of Successful Detection Radar Waveform N} = P_dN$$

In addition an aggregate minimum percentage of successful detection across all Short Pulse Radar Types 1-4 is required and is calculated as follows:

$$\frac{P_d 1 + P_d 2 + P_d 3 + P_d 4}{4}$$

The minimum number of trials, minimum percentage of successful detection and the aggregate minimum percentage of successful detection are found in **Table 5**.

**Table 5**

| Radar Type                  | Pulse Width (μsec) | PRI (μsec)   | Number of Pulses   | Minimum Percentage of Successful Detection | Minimum Trials |
|-----------------------------|--------------------|--|--|--|----------------|
| 0                           | 1                  | 1428   | 18   | See Note 1                                 | See Note 1     |
| 1                           | 1                  | Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a<br>Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A | Roundup $\left\lceil \left( \frac{1}{360} \cdot \frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\rceil$ | 60%  | 30             |
| 2                           | 1-5                | 150-230  | 23-29  | 60%  | 30             |
| 3                           | 6-10               | 200-500  | 16-18  | 60%  | 30             |
| 4                           | 11-20              | 200-500  | 12-16  | 60%  | 30             |
| Aggregate (Radar Types 1-4) |                    |  |  | 80%  | 120            |

**Note 1:** Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

**Pulse Repetition Intervals Values for Test A**

| Pulse Repetition Frequency Number | Pulse Repetition Frequency (Pulses Per Second) | Pulse Repetition Interval (Microseconds) |
|-----------------------------------|--|--|
| 1                                 | 1930.5   | 518                                      |
| 2                                 | 1858.7   | 538                                      |
| 3                                 | 1792.1   | 558                                      |
| 4                                 | 1730.1   | 578                                      |
| 5                                 | 1672.2   | 598                                      |
| 6                                 | 1618.1   | 618                                      |
| 7                                 | 1567.4   | 638                                      |
| 8                                 | 1519.8   | 658                                      |
| 9                                 | 1474.9   | 678                                      |
| 10                                | 1432.7   | 698                                      |
| 11                                | 1392.8   | 718                                      |
| 12                                | 1355   | 738                                      |
| 13                                | 1319.3   | 758                                      |
| 14                                | 1285.3   | 778                                      |
| 15                                | 1253.1   | 798                                      |
| 16                                | 1222.5   | 818                                      |
| 17                                | 1193.3   | 838                                      |
| 18                                | 1165.6   | 858                                      |
| 19                                | 1139   | 878                                      |
| 20                                | 1113.6   | 898                                      |
| 21                                | 1089.3   | 918                                      |
| 22                                | 1066.1   | 938                                      |
| 23                                | 326.2  | 3066                                     |

### Long Pulse Radar Test Waveforms

Statistical data will be gathered to determine the ability of the device to detect the Long Pulse Radar Type 5 found in **Table 6**. The device can utilize a test mode to demonstrate when detection occurs to prevent the need to reset the device between trials.

**Table 6**

| Type | Pulse Width (μsec) | Chirp Width (MHz) | PRI (μsec) | Number of Pulses per Burst | Number of Bursts | Minimum Percentage of Successful Detection | Minimum Number of Trials |
|------|--------------------|-------------------|------------|----------------------------|------------------|--|--------------------------|
| 5    | 50-100             | 5-20              | 1000-2000  | 1-3                        | 8-20             | 80%  | 30                       |

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Note: The center frequency for each of the 30 trials of the Bin 5 radar shall be randomly selected within 80% of the Occupied Bandwidth.

- (1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
- (2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst\_Count.
- (3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
- (4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
- (5) Each pulse has a linear frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a transmission period will have the same chirp width. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
- (6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
- (7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst\_Count. Each interval is of length  $(12,000,000 / \text{Burst\_Count})$  microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and  $[(12,000,000 / \text{Burst\_Count}) - (\text{Total Burst Length}) + (\text{One Random PRI Interval})]$  microseconds, with the start time being randomly chosen. The step interval for the start time is 1

microsecond. The start time for each Burst is chosen independently.

Three subsets of trials will be performed with a minimum of ten trials per subset.

The subset of trials differs in where the Long Pulse Type 5 Signal is tuned in frequency:

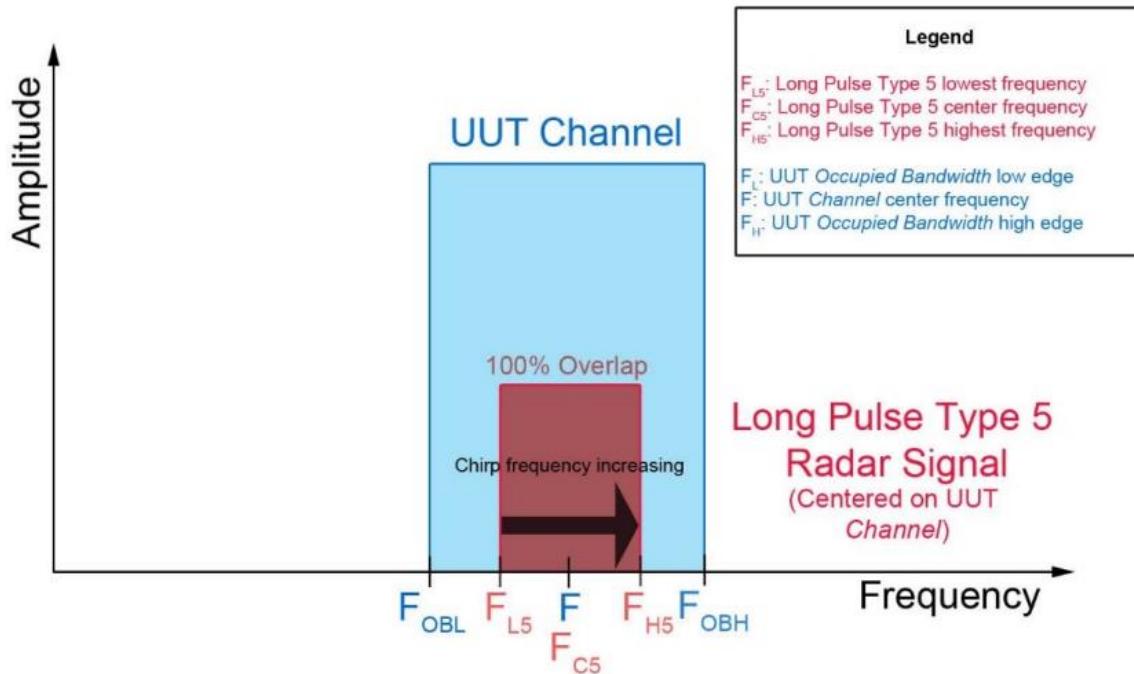
- a) The Channel center frequency (subset case 1).
- b) Tuned frequencies such that 90% of the Long Pulse Type 5 frequency modulation is within the low edge of the UUT Occupied Bandwidth (subset case 2).
- c) Tuned frequencies such that 90% of the Long Pulse Type 5 frequency modulation is within the high edge of the UUT Occupied Bandwidth (subset case 3).

For subset case 1: the center frequency of the signal generator will remain fixed at the center of the UUT Channel.

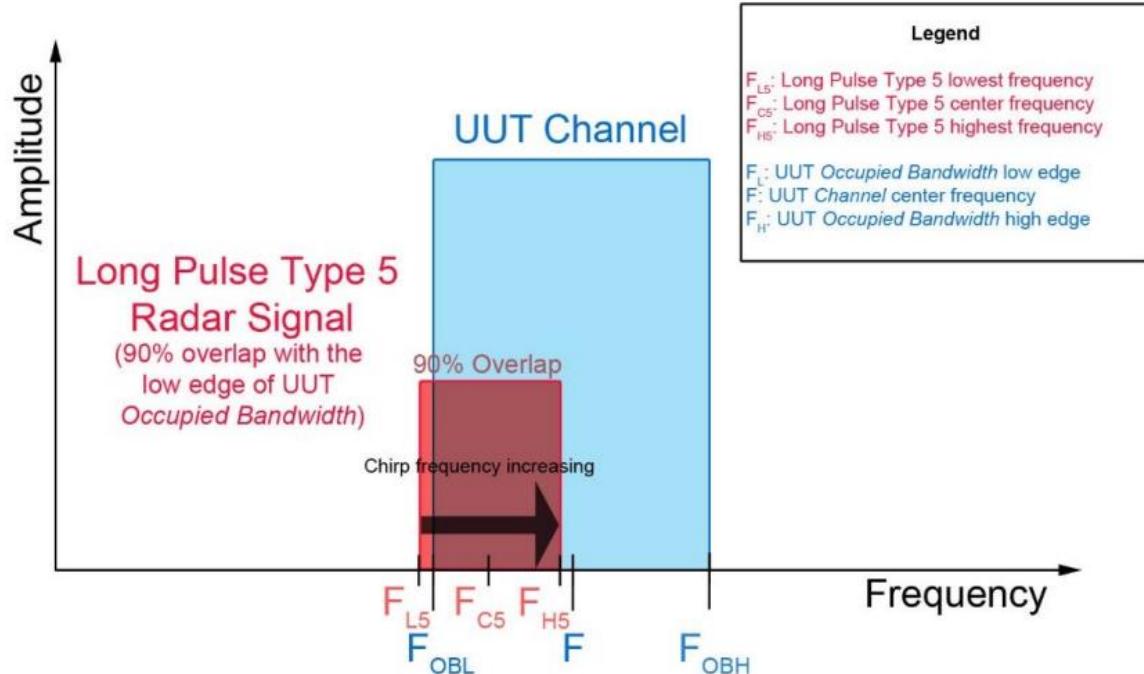
For subset case 2: to retain 90% frequency overlap between the radar signal and the UUT Occupied Bandwidth, the center frequency of the signal generator will vary for each of the ten trials in subset case 2. The center frequency of the signal generator for each trial is calculated by:  $FL + (0.4 * Chirp\ Width\ [in\ MHz])$

For subset case 3: to retain 90% frequency overlap between the radar signal and the UUT Occupied Bandwidth, the center frequency of the signal generator will vary for each of the ten trials in subset case 3. The center frequency of the signal generator for each trial is calculated by:  $FH - (0.4 * Chirp\ Width\ [in\ MHz])$

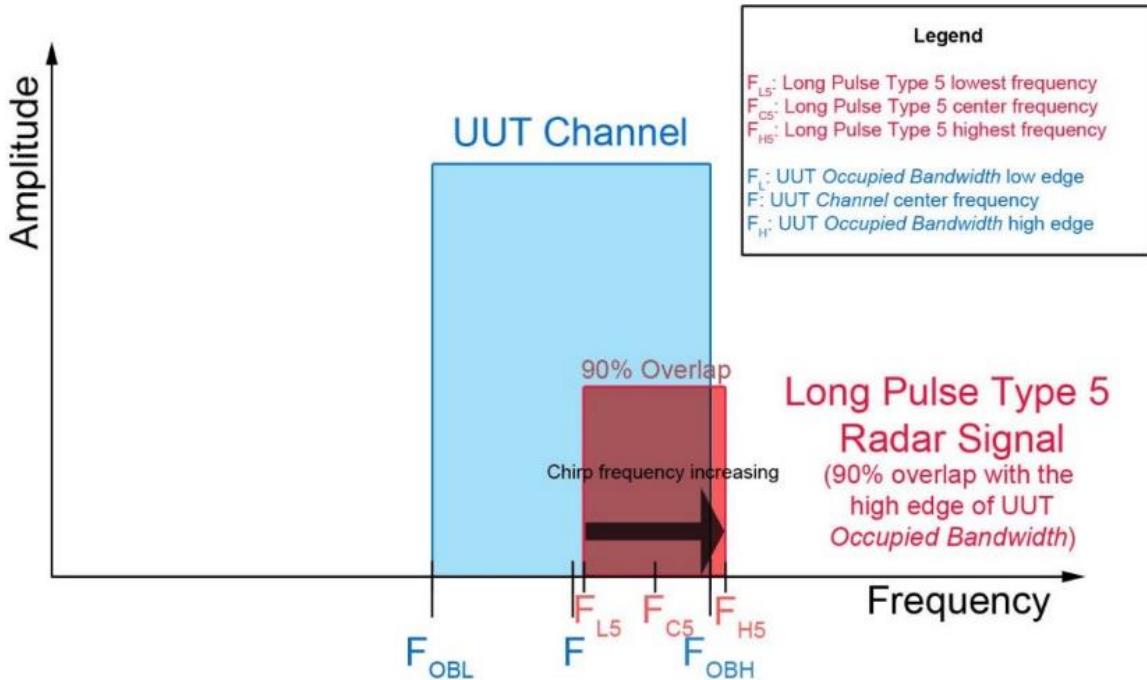
a) Channel center frequency (subset case 1)



b) Tuned frequencies such that 90% of the Long Pulse Type 5 frequency modulation is within the low edge of the UUT Occupied Bandwidth. (subset case 2)



c) Tuned frequencies such that 90% of the Long Pulse Type 5 frequency modulation is within the high edge of the UUT Occupied Bandwidth. (subset case 3)



The percentage of successful detection is calculated by:

$$\frac{\text{TotalWaveformDetections}}{\text{TotalWaveformTrials}} \times 100$$

### Frequency Hopping Radar Test Waveform

Statistical data will be gathered to determine the ability of the device to detect the Frequency Hopping radar test signal (radar type 6) found in Table 7. The device can utilize a test mode to demonstrate when detection occurs to prevent the need to reset the device between trial runs. The probability of successful detection is calculated by:

$$\frac{\text{TotalWaveformDetections}}{\text{TotalWaveformTrials}} \times 100$$

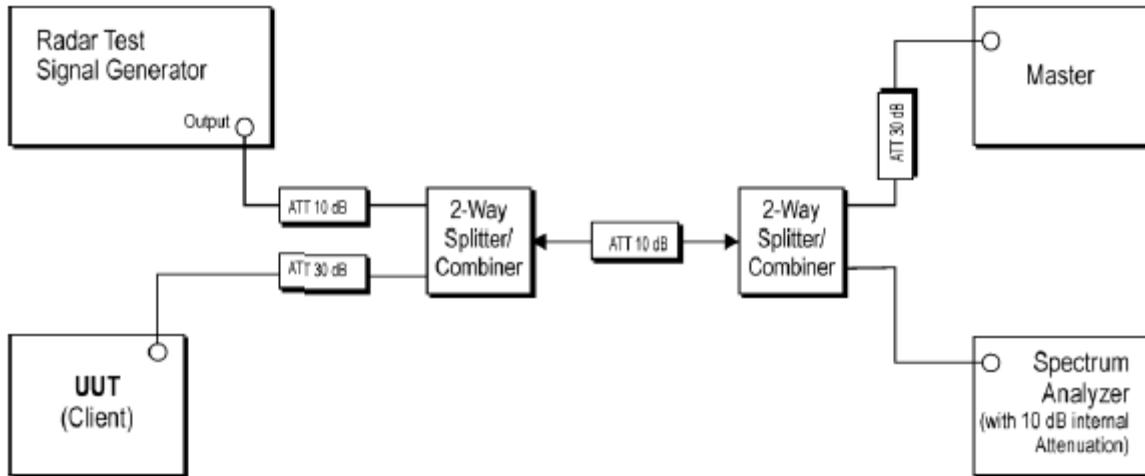
**Table 7**

| Radar Type | Pulse Width (μsec) | PRI (μsec) | Pulses per Hop | Hopping Rate (kHz) | Hopping Sequence Length (msec) | Minimum Percentage of Successful Detection | Minimum Number of Trials |
|------------|--------------------|------------|----------------|--------------------|--------------------------------|--|--------------------------|
| 6          | 1                  | 333        | 9              | 0.333              | 300                            | 70%  | 30                       |

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

## 2.6 Test Setup



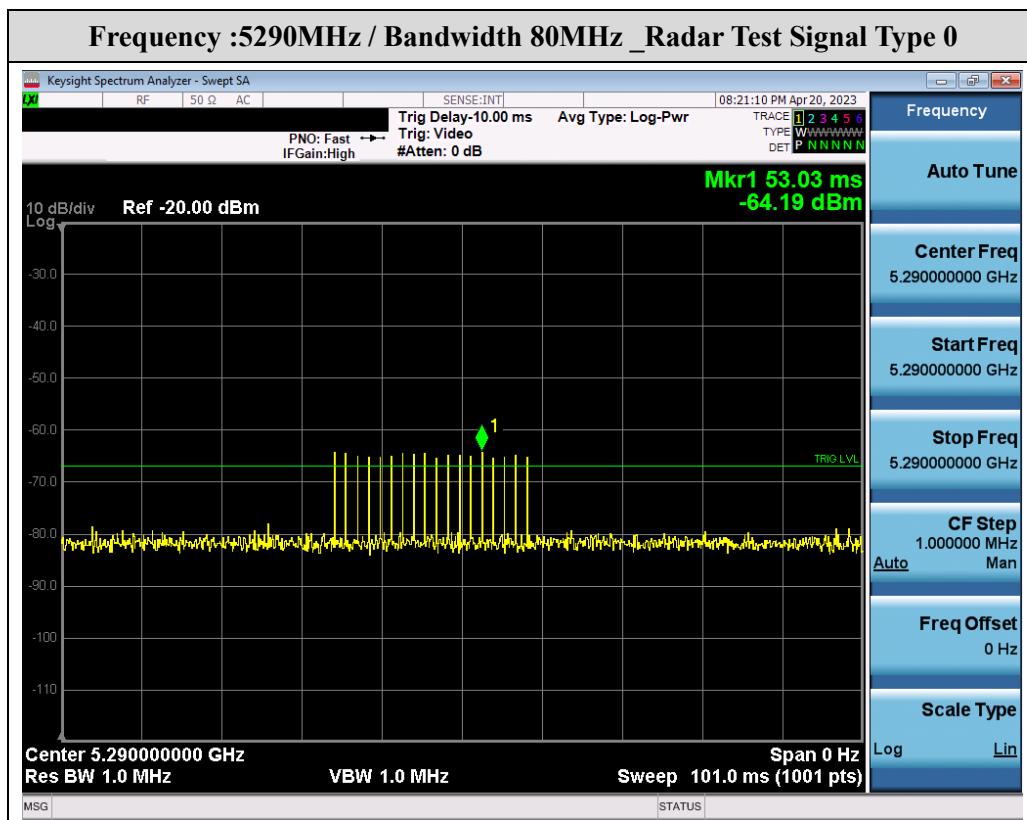
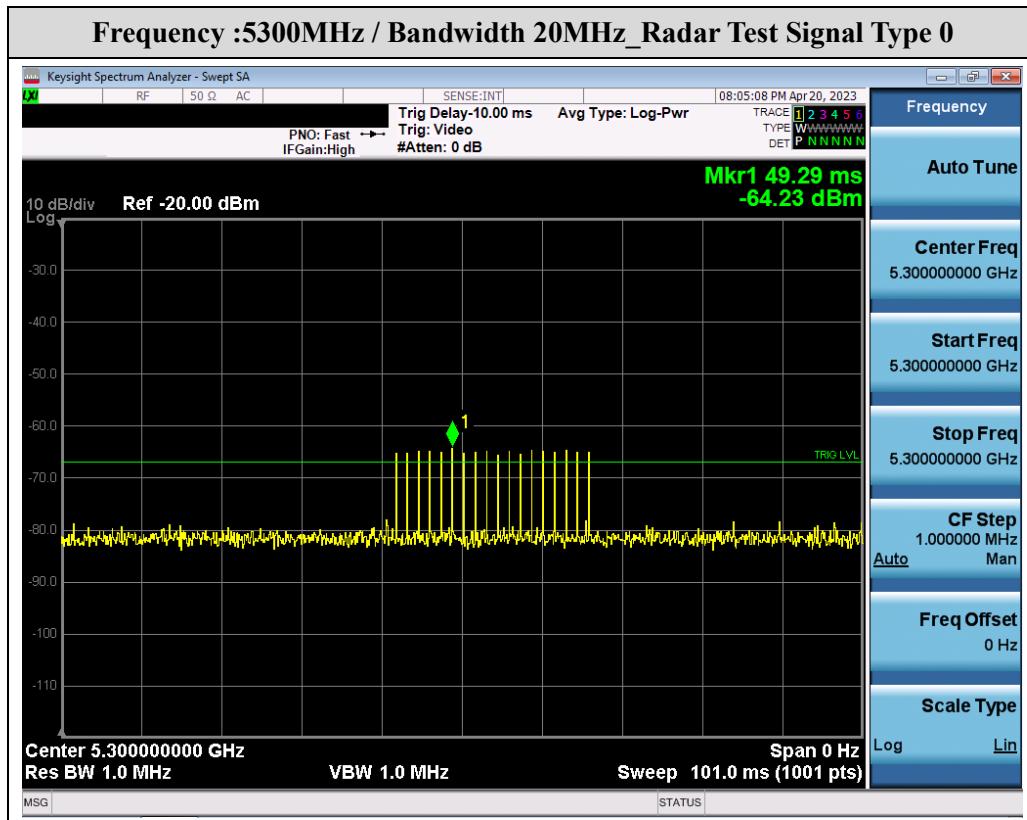
## 2.7 Radar Test Waveform

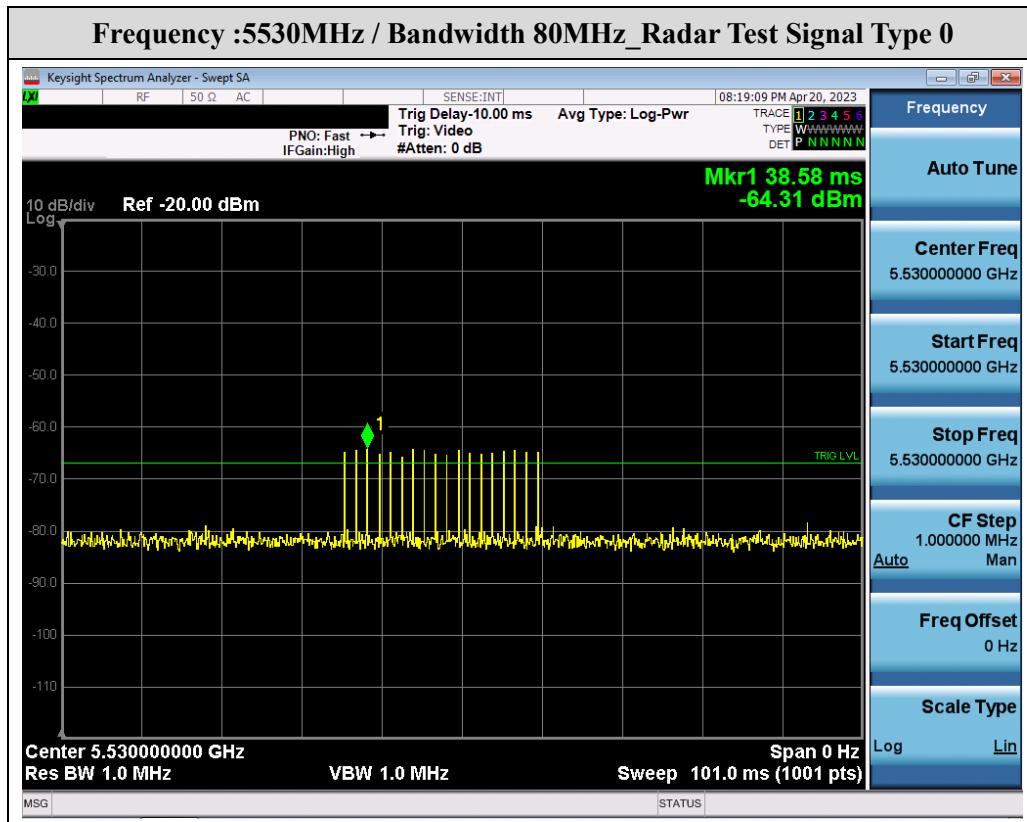
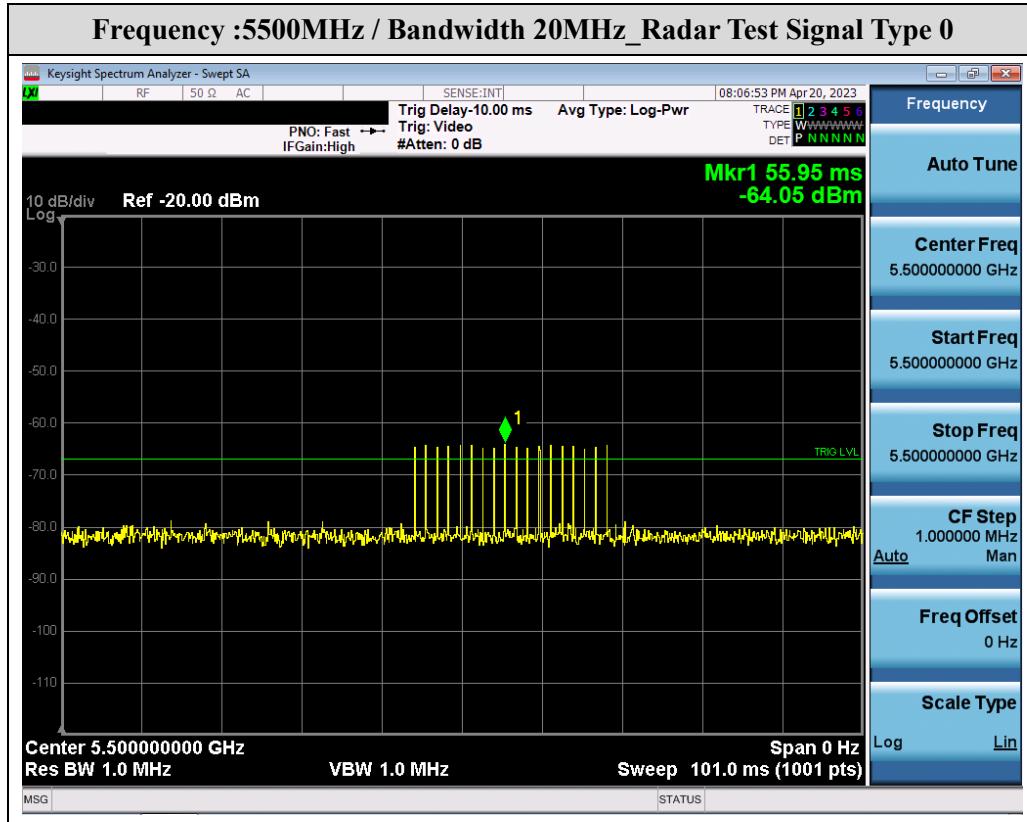
This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

### 2.7.1 Test Procedure

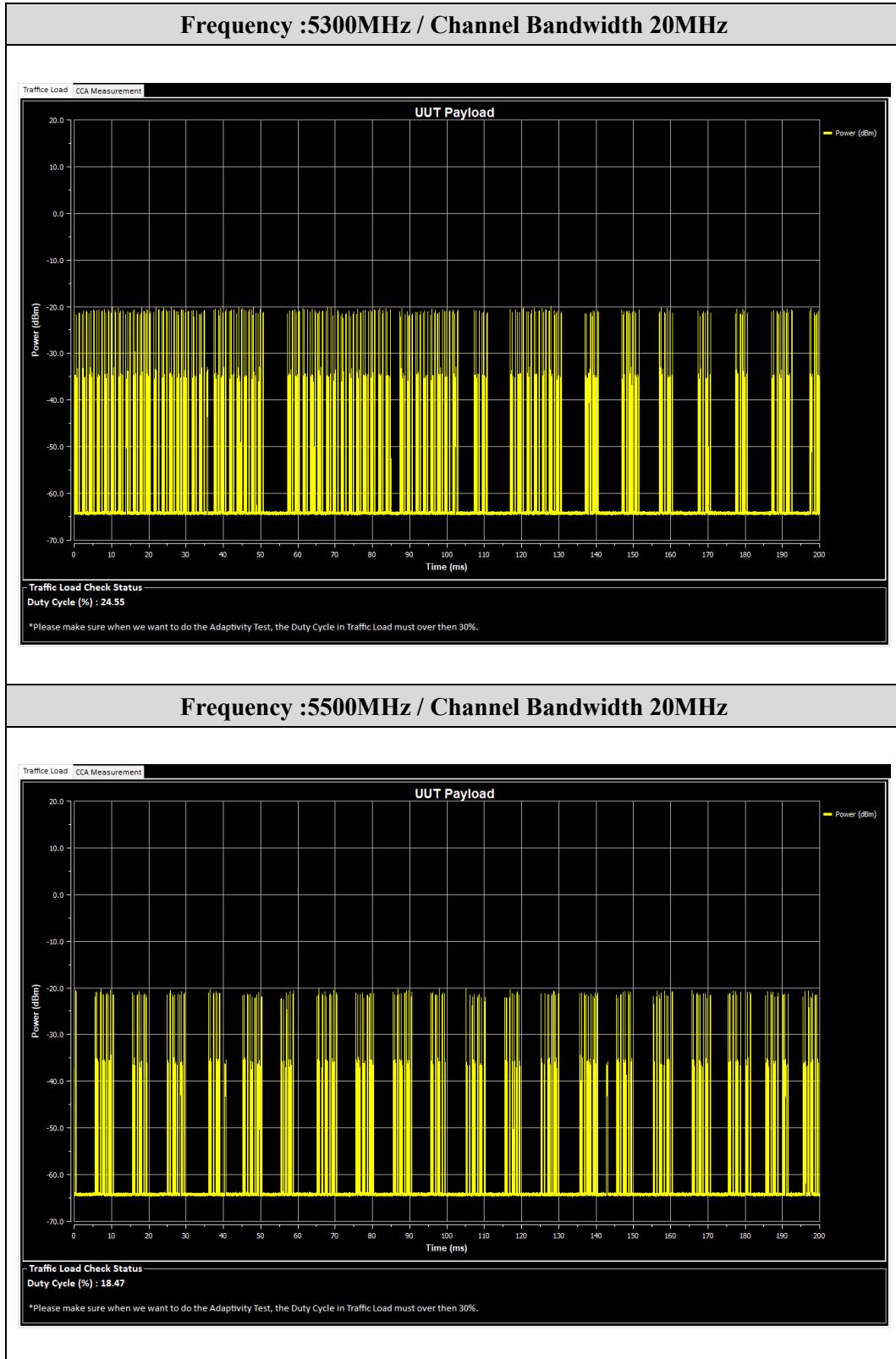
The spectrum analyzer was switched to the zero span (Time Domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer RBW and VBW were set to 3 MHz to measure the radar waveform.

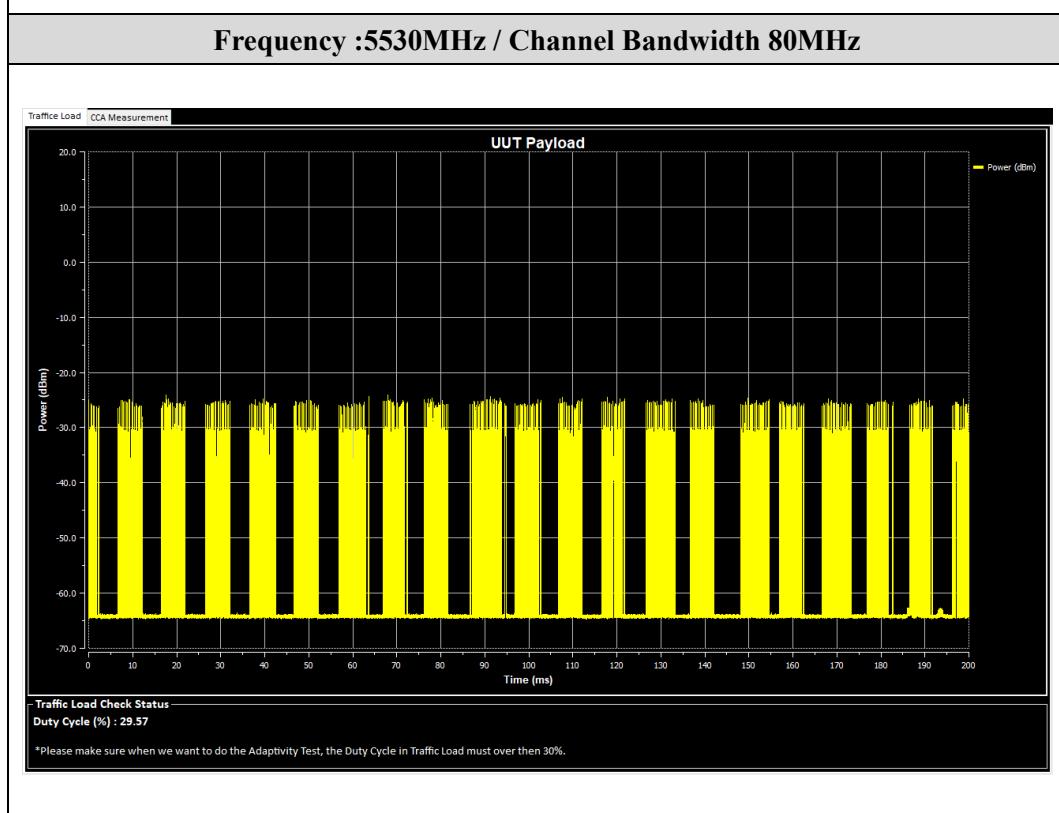
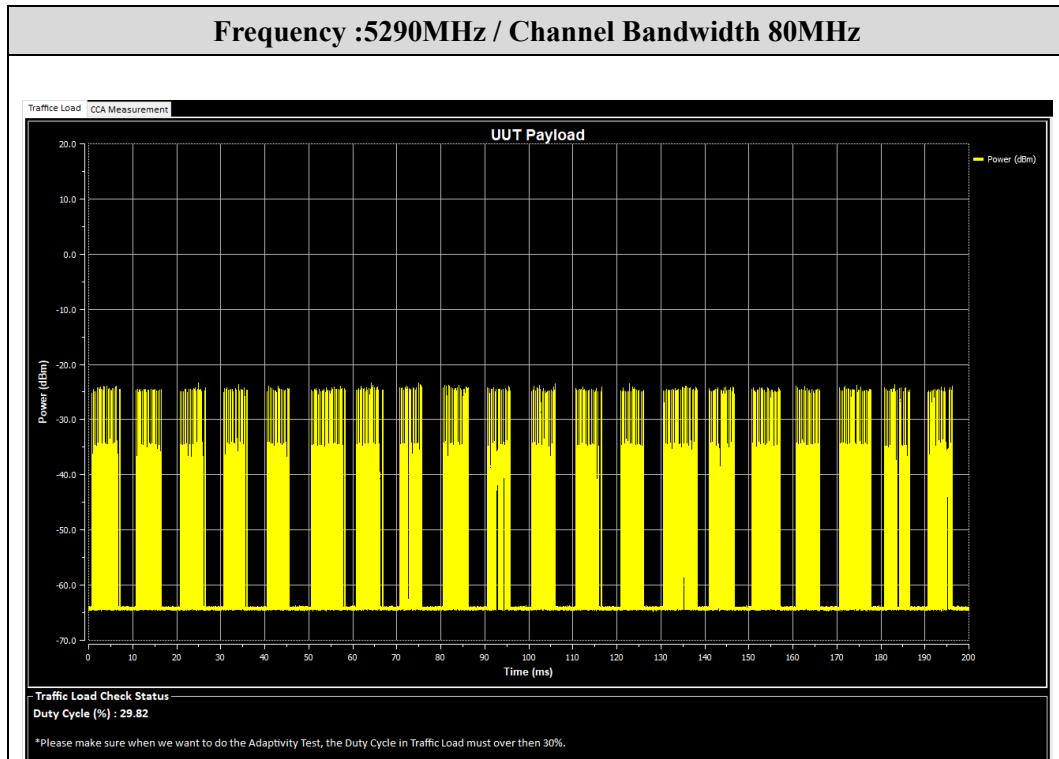
### 2.7.2 Radar Test Signal Plots





### 2.7.3 Slave Data Traffic Plot Result





## 2.8 In-Service Monitoring for Channel Move Time and Channel Closing Transmission Time and Non-Occupancy Period

### 2.8.1 Test Procedure

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the U-NII device (In- Service Monitoring).

- a) One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands. For 802.11 devices, the test frequency must contain control signals. This can be verified by disabling channel loading and monitoring the spectrum analyzer. If no control signals are detected, another frequency must be selected within the emission bandwidth where control signals are detected.
- b) In case the UUT is a U-NII device operating as a Client Device (with or without DFS), a U-NII device operating as a Master Device will be used to allow the UUT (Client device) to Associate with the Master Device. In case the UUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will Associate with the UUT (Master). In both cases for conducted tests, the Radar Waveform generator will be connected to the Master Device. For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.
- c) Stream the channel loading test file from the Master Device to the Client Device on the test Channel for the entire period of the test.
- d) At time  $T_0$  the Radar Waveform generator sends a Burst of pulses for one of the Radar Type 0, on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- e) Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Measure and record the Channel Move Time and Channel Closing Transmission Time if radar detection occurs. Figure 17 illustrates Channel Closing Transmission Time.
- f) When operating as a Master Device, monitor the UUT for more than 30 minutes following instant  $T_2$  to verify that the UUT does not resume any transmissions on this Channel. Perform this test once and record the measurement result.
- g) In case the UUT is a U-NII device operating as a Client Device with In-Service Monitoring, perform steps a) to f).

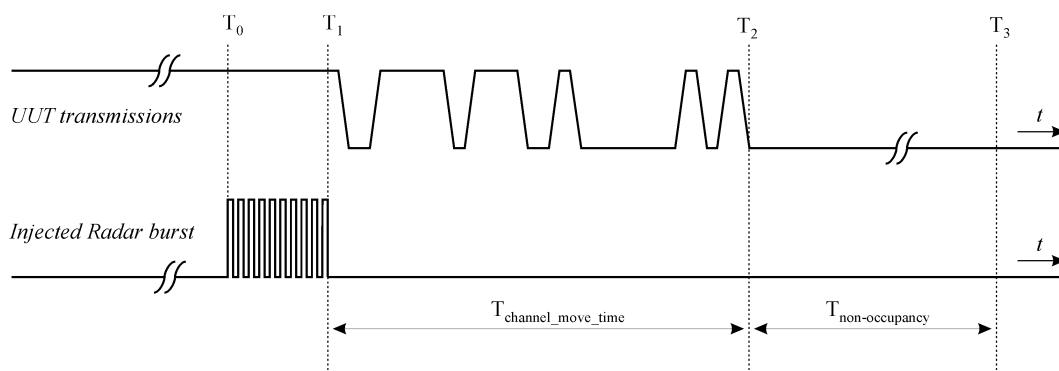


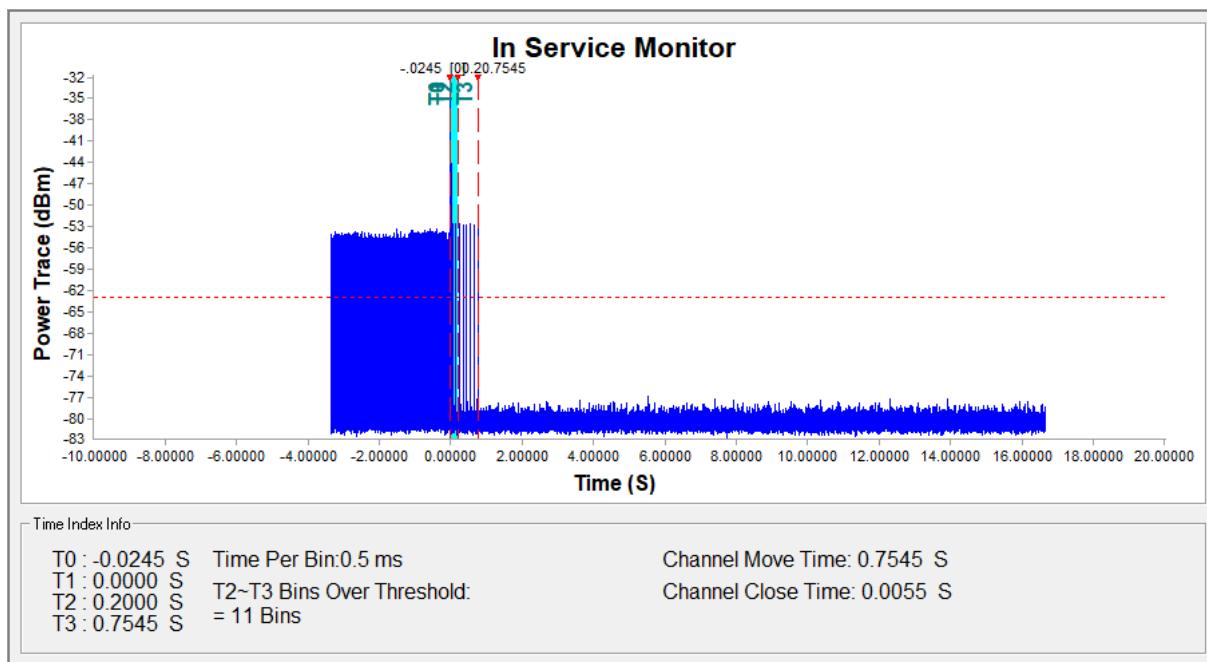
Figure 17: Channel Closing Transmission Time, Channel Move Time and Non-Occupancy Period

## 2.8.2 Test Result

### 5290MHz

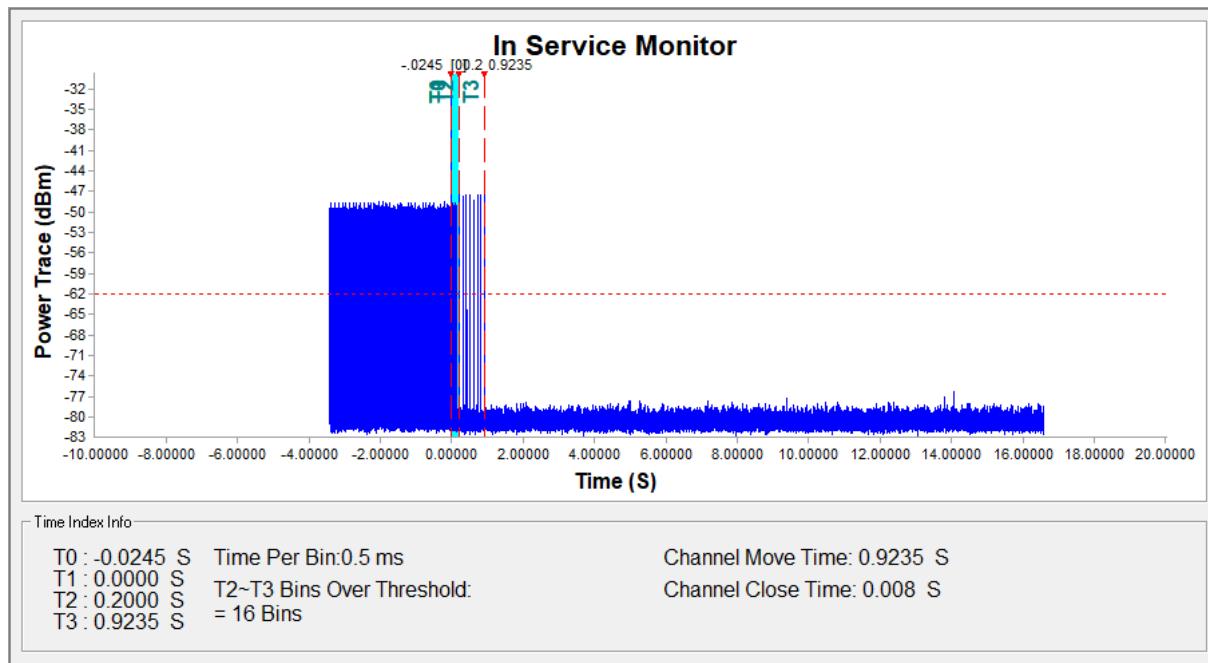
| Test Item                         | Measured Value (s) | Limit   | Result |
|-----------------------------------|--------------------|---|--------|
| Channel Move Time                 | 0.7545             | < 10s   | Pass   |
| Channel Closing Transmission Time | 0.0055             | 200 milliseconds + approx. 60 milliseconds over remaining 10 seconds period | Pass   |

### Channel Move Time and Channel Closing Transmission Time for Radar Test Type 0 at 5290MHz



**5530MHz**

| Test Item                         | Measured Value (s) | Limit   | Result |
|-----------------------------------|--------------------|---|--------|
| Channel Move Time                 | 0.9235             | < 10s   | Pass   |
| Channel Closing Transmission Time | 0.0080             | 200 milliseconds + approx. 60 milliseconds over remaining 10 seconds period | Pass   |

**Channel Move Time and Channel Closing Transmission Time for Radar Test Type 0 at 5530MHz**


**5290 MHz**

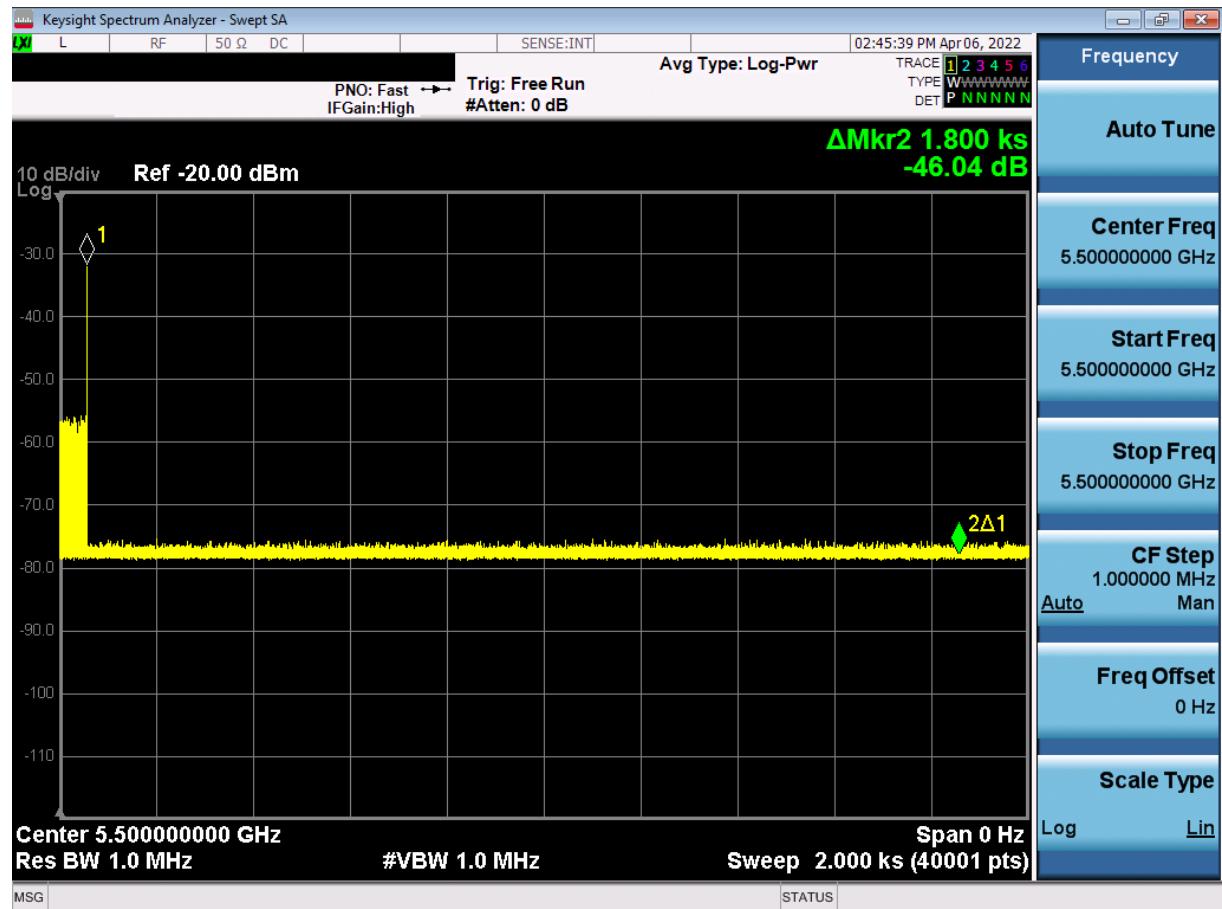
| Test Item            | Test Result (minute) | Limit (minute) | Result |
|----------------------|----------------------|----------------|--------|
| Non-Occupancy Period | 30                   | 30             | Pass   |

## Non-Occupancy Period for Radar Test Type 0 at 5290 MHz



**5500 MHz**

| Test Item            | Test Result (minute) | Limit (minute) | Result |
|----------------------|----------------------|----------------|--------|
| Non-Occupancy Period | 30                   | 30             | Pass   |

**Non-Occupancy Period for Radar Test Type 0 at 5500 MHz**


--- END ---